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Midsummer in a beech-maple climax forest near Smith, Indiana. Photograph by Earl G. Wright.

Pyramids of Palos

A. S. Windsor

> "The Ant, as the Prince of Wisdom is pleased to inform us, is exceedingly wise. In this Light it may, without Vanity, boast of its being related to you, and therefore by right of Kindred merits your Protection."
>
> —William Gould, *An Account of English Ants,* 1747.

FOR almost ten years I have watched the spectacular mounds of *Formica ulkei,* a sparsely distributed but exceedingly interesting ant, endure the wear and weathering of the seasons near Palos Park. Even when judged by human standards a decade is not brief, and for the ant it must be infinitely longer. Who knows but that to the worker which lives but three or four years, or even to the queen whose mature life span may reach ten or fifteen, these mounds—majestic monuments to their tireless endeavor—may be as age-resisting and enduring as the pyramids of Egypt! As the great monuments along the Nile took shape, stone upon stone and life upon life, the importance of the individual was dwarfed to insignificance, yet the combined effort of numberless workers produced structures which may resist the passing of a million years. So with the ants: a continuous succession of individual lives, each carrying to the surface her tiny burden—a pellet of earth—each worker replaced, when she dies, by another and then another, similarly imbued with the same constructive instincts.

Standing before one of these insect sanctuaries, I recall, invariably, the pleasure which accompanied my first visit to these large mounds. My companion on this occasion was Dr. T. C. ("Ted") Schneirla, now of New York University. Having been told of the aggregation of mounds we wandered erratically over a considerable area in our efforts to follow rather vague directions. At last we came upon one, rising sharply out of the side of a ditch bank. The size and appearance of the mound alone were enough to convince us that we had found an ant worthy of our diligent search. The trowel pierced the sun-baked periphery of the cap and only a glance at one of the forceps-held workers was necessary for Ted to assure me that it was *ulkei.* A small complement of workers was placed in vials of alcohol, a superficial examination of the tunnels was made, then the earth was returned to the wound in the mound and we left it very little the worse for our inquiry. A short time later that year I returned to this mound and, taking the only direction in which we had not searched before, came upon a semi-circular clearing at the edge of a dense oak woods. Dotted here and there among the scrub bushes between the towering oaks and the grassy clearing were eight or ten huge conical mounds. Upon looking

Dr. Schneirla calls at the shrine of one of Chicago's most sensational communities of ants.

more carefully about, I saw dozens of mounds, each one placed rather equidistant from the others. There was no doubt that I had come upon "ulkei-land"—the "promised land" to him who inquires into the ways of the interesting ants. On August 13, 1939, Ted and I again went to ulkei-land, and even to the site of the first mound we had found together in 1931, which, since ditch-widening operations had dealt less tenderly with it than had we, had long been abandoned.

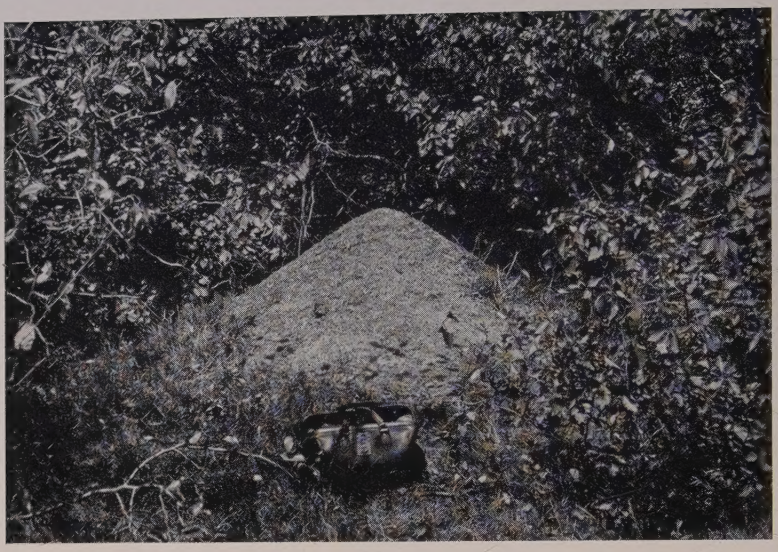
Be assured that in talking of ant mounds the use of such adjectives as "huge" is strictly relative. We who roam the meadows and the waste places to become familiar with the habits of ants consider a mound eighteen inches in diameter and ten or twelve inches in height as "large." Thus, in comparison, a mound seven feet in diameter at the base and towering up to a vertex three feet above the ground level would have to be referred to as "gigantic." Several of the ulkei-land mounds are of such dimensions—all are distinctly "large" except the young ones, for the different nests tend to the same architectural style.

Several years ago a census was taken of all mounds in this area of not more than a few acres, and the total number was over four hundred. Over half of the mounds bordered the oak forest, about a third were found in small clearings in the forest where the sun could penetrate effectively even in the summer, and the rest were out in the open lowlands with no trees about them. Truly a wondrous aggregation of ant communities! There are but few other sites where this ant is

found in such great concentrations in the Chicago Area. It is, in fact, to be considered a rare ant. The few localities in the region where it has been taken present the same general type of communities although on a more modest scale. A somewhat similar group of mounds has been found near Palatine, but recent visitors have said that they are rapidly declining. Near Hammond, Indiana, I came upon a group of these mounds in the early spring of 1938. These were by no means as numerous and the size of the individual mound was not particularly spectacular.

The superstructures of the nests of *Formica ulkei*, the mounds in the Palos region, are of an interesting composition. Around the edge of the forest they are made up principally of clay, with small twigs, leaf petioles, and the like, mixed in. The surface is fused by the rain and becomes quite hard. This outer cap, usually about an inch in thickness, effectively protects the honeycombed maze of earth tunnels beneath it. The much-used entrances are more numerous around the base, and here since the galleries are being constantly extended or repaired is inevitably an accumulation of fresh earth pellets brought out from the interior. During the most active summer period the accumulation may even cover the entire mound. The more vigorous mounds are usually entirely bare, although on some a few tufts of grass have escaped the "home improvement brigade." Grass and small shrubs yield to the onslaughts of these industrious insects and it seems

A rapidly growing, young mound of *Formica ulkei*.



A typical mound at the height of the most active season.

probable that the ants exert some restraining influence on young trees that are wont to compete. If vegetation were to become dense about a mound, the ant community would soon be choked out, for ants must be hot to be most active and the temperature of the earth inside the mound is a most important determiner of how rapidly the broods are to be matured. In short, a low temperature brought about by a damp shady location would restrict the population of the mound and thus cause the community to decline gradually, if indeed not bring it to total extinction.

Preëminent students of ants have given us a most pleasing concept of the ant colony: that it should not be thought of in terms of its individual units, the ants, but that the entire community be considered a single organism. This is not entirely new to us, for one seldom thinks of the individual cells that make up the human body—but of the body as a whole. In the ant colony the reproductive functions are cared for by the fertilized queen and her ephemeral consort, nutriment is brought into the "body" by some of the workers, and the excretory functions are performed by certain others. The analogy is obvious. Therefore, in looking over some four hundred of these colonial organisms, we can see interesting individual differences. There is the young mound, not more than a foot in diameter and of similar height. We know that its population is strong and most active because over the mound is a virtual covering of fresh earth crumbs, sticks,

Same mound shown on left, sealed over with a heavy layer of ice and draped in a wintery blanket.

and other chippage. Then there is the colony at the very climax of its life, the large conical mound, sturdy, stalwart, and actually of sufficient solidarity to deflect as large an animal as a cow. In other mounds we find that senescence has begun. Instead of the piercing crown the apex has melted away until only a plateau six or eight inches high is left. All activity may have ceased except in one small area where a few individuals struggle valiantly but hopelessly to restore the former rugged strength of the colony. In another case, we see tell-tale moss as it enshrouds a victim of adverse circumstances. The final stage is seen when grass regains complete possession and scarcely any elevation of the earth can be detected at the spot where once trod tens of thousands of hurrying, busy workers in earthen temples.

The individual *ulkei* workers are of sturdy stature, not the largest in the region, but definitely of a large size, about one fourth of an inch long. They have moderately long legs so that they get about with great agility, and their trim thoraces and gasters suggest great endurance. Their heads and gasters are deep brown or black in color and the thoraces a pale reddish brown. The bite of these ants is rather forceful—especially if it be in a tender spot—and they cling tenaciously! To stand beside the mound in a seething mass of these ants is far from comfortable, and browsing animals have undoubtedly found it

best to forage at a safe distance from the main trails lest their nostrils become plagued with tenacious defenders.

Valiant though these ants be, and proud their pueblos, there is to be recounted one surprising but undoubted weakness. Because of the close affinities of this species to others which are better known, it is most commonly thought that *F. ulkei* is a temporary parasite on another species. That is, the young *ulkei* queen, after her marriage flight, in all probability enters the nest of a very young colony of another species. She may not be received amicably at first, but may succeed in becoming adopted. (Think of the thousands of queens that will not survive such a rigorous vicissitude—only an occasional one being successful!) The host queen is killed and the host workers care for their new center of interest as zealously as they did for their own mother. Her eggs are tended, they mature, and gradually a goodly number of *ulkei* workers become active in the mound. Old age gradually eliminates the workers of the host species so that eventually a pure *ulkei* colony results. Whether or not this actually takes place we do not know; more observations on *ulkei* will have to be made. Once a colony becomes well established it may give rise to other colonies by budding, the precise method of which, in this species, is not exactly known. This phenomenon, however, probably explains why the mounds are so numerous in a small area.

These vast hordes of hurrying communal organisms require a never failing food supply. Hordes? Yes, and then some! My guess as to the total number of ants of this species in the Palos group is sixty millions! This is only a rough figure, of course, and one which might vary either way by fifty per cent. You would probably arch your eyebrows if told that these ants eat oak trees, but, indirectly, such trees do furnish a considerable proportion of their nutriment. The intermediate agent, an all-important ally, is the ubiquitous aphid or plant louse which feeds by piercing the epidermis of plants and sucking the sap. The droplets of honeydew (undigested sap) given off by aphids, are sweet and delectable to the ants, and thus the plant lice of the oaks provide much food for our mound builders.

Upon a recent visit to the Palos mounds, I saw a stream of ants communicating with an oak along a trail some three inches wide. The trail began at a large mound and connected with the tree. Great numbers of ants ascended the trunk and went out to the leaves which were curled over groups of plant lice. When heavily laden, they returned their sweet cargo over the same trail to workers in the nest and to the masses of brood. This was not the only evidence of feeding, of course; many workers brought in grasshoppers, caterpillars, and other small insects.

(Continued on page 91)

New York Aquarium—Dunton Photograph

The Fish With the Magic Eye

Gordon L. Walls

EVER swim under water? Couldn't see anything very clearly, could you? That wasn't all because the water was murky, or because even pure water absorbs a great deal of light and thus dims vision through it. It was largely because while you were under water your eyes—optically speaking—had no corneas.

The cornea, that clear watch-glass which covers the colored part of the eye, is the real lens of the living camera. It has a sharply curved, spherical surface, and when parallel light-rays strike it through the air they are converged and focussed within the eyeball. The image of an external object is thus made to fall on the sensitive retina, lining the back of the eye. A minor part in this focusing process is played by the crystalline lens inside the eye—some near-sighted persons even see clearly, without spectacles, when the lens has been removed because of the condition called cataract. The lens, however, is enormously important in adjusting precisely the focus of the image by automatic muscular actions. Thus, although the cornea "does most of the work" of placing the image on the retina, the lens is indispensable in moving that image slightly forward or backward and in keeping it sharply focussed when the object approaches or recedes from us.

Under water, the light rays no longer reach the optically dense cornea through a rare medium, and upon striking it are not bent and brought to a focus. Only the much less effective action of the lens

remains, and the sharp image lies behind the retina with a blurred one caught on the retina itself. So, if we wish to see sharply under water we must borrow the flat, water-tight goggles of the life-guard, which keep air in contact with the curved cornea and allow it to remain, optically, among those present.

Obviously, the fish—or any other aquatic vertebrate—has quite a problem. His cornea might as well not be there, and his crystalline lens has to do the whole task of focussing the image and of changing the focus—"accommodating"—for different object-distances. While the human lens is flattened like an aspirin tablet, the lens in a fish's eye must be as strongly curved as possible to keep the eyeball reasonably small and to compensate for the uselessness of the cornea. And, since the most strongly curved shape a compact, symmetrical piece of material can have is a sphere, it is not surprising that the typical fish lens is an almost perfect ball.

There is nothing in nature which is more thoroughly standardized than the design of the fish eye. Though animals which look through air may have the parts of their eyes variously shaped and sized and still attain a working harmony which suits their eyes to one or another of various widely differing visual tasks, the fish is forced into a single mold. Water is water and a sphere is a sphere, vision beyond a few yards is impossible because of absorption, and vision through the surface is possible only through a definite angle apexed on the fish. These constancies, the same for all fishes, impose limitations within which all the parts of the eye must fall—with almost audible clicks! Though a fish eye may be tiny because there is no room in the head for a bigger one, or enormous in order to let in enough light to permit its owner to be a night-prowler, the eye exhibits the same internal shape and dimensional relationships. For example, the quotient of the distances from the center of the lens to its surface and to the retina is constant, in eyes large and small, to three decimal places. This standard value—2.55—is called Matthiessen's ratio, after its discoverer, who labored long over the optics of the fish eye and found that when he had done this for one he had done it for most.

Of course there are exceptions; and none—in fact, no vertebrate eye outside the fish group or within it—is so altogether remarkable as the eye of the tropical American fish genus *Anableps*. These fishes, whose scientific name means "upward-looking," first received scientific adoration in 1758, and have permanent possession of the trophy for ocular miracles.

Anableps sees clearly through air and through water *at the same time*. The optical revolution which made this improbability possible is all the more amazing when we keep in mind the restrictions pointed

out above. A terrestrial vertebrate species can do weird things to the structure of its eye with relative ease; but for a *fish* to have anything but an insouciantly irregular (since entirely meaningless) corneal surface, and a sternly regular spherical lens with Matthiessen's ratio rearing up on the slide rule . . . well!

You might think that *Anableps* would have been content with developing a great range of accommodation like the turtle or the cormorant or the sea-otter, all of them forms which must, one moment, see sharply through the air and in the next instant as sharply through water, with the lens squeezed tremendously—even the iris itself helping out by closing the pupillary aperture powerfully around the front part of the lens—in order to compensate for the lost corneal refraction of the light.

Or, *Anableps* might have been satisfied to look through air *or* through water, without benefit of accommodation at all, by adopting the lazy way of the seals: the moment the head is out of water the pupil closes to a pinhole which eliminates all need for a lens, cornea, or any other focussing device in the optical system, which, in the seals, is adjusted for under-water vision. Thus the seal's eye, in the air, has a "universal focus" like the old-time, lensless, pinhole camera.

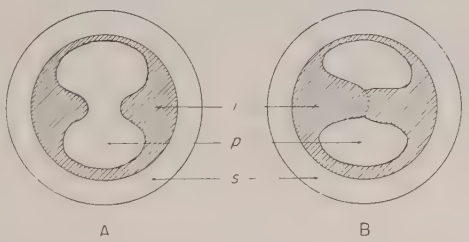


Fig. 2. Development of double pupil in *Anableps anableps*. A. 35mm. larva; B, adult; *i*, iris; *p*, pupil; *s*, sclera. Redrawn from Schneider and v. Orelli.

But no—*Anableps* can be very lively at times, and even comes out on land; but he chiefly wanted to be able to loaf along at the water's surface in his quiet lagoon, see a heat-dizzy insect about to plunge through that surface, and catch it unerringly once it had done so. No guess-work for little *Anableps*. Leave that for the trout—and look at what happens to *him!* So, *Anableps* adjusts his submergence tank for running awash with his froggy eyes *half* out of water (Fig. 1). As the baby fish grows up, the iris grows in from either side and pinches the pupil aperture neatly in two, so that "Four-eyes" has one pupil aimed into the air with which he looks upward with the ventral half of his retina, and a smaller pupil aimed down into the water through which the dorsal retina sees (Fig. 2).

But—the cornea? Half of it out of water, and hence acting to converge light rays; and half under water and *hors de combat?* A perfectly flat upper half would have done the trick, but a flat surface would have been very difficult to maintain against the internal fluid pressure which keeps the eyeball turgid and prevents those important optical distances from varying disastrously. So, as in the garden

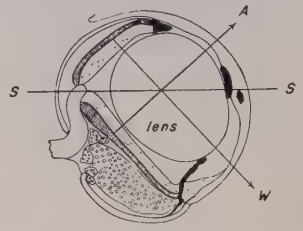


Fig. 3. Vertical section of eye of *Anableps anableps,* schematic. *S-S,* plane of water surface; *A,* line of sight upward into air; *W,* line of sight downward into water. From Pütter, after Klinkowström.

variety of fish eye, the lens again has to do it all. The picture (Fig. 3) shows how the surfaces of the lens which lie in the upward line-of-sight are *flattened,* lessening their converging power in order to allow the cornea to place the image on the ventral part of the retina.

Here, then, is a special kind of "poor fish"—one whose ancestral germ-plasm was rich in ingenuity. See sharply, simultaneously, through both air and water? It's manifestly impossible—but it happens, through the magic eye of *Anableps.*

—Ophthalmic Research Laboratory, Wayne University College of Medicine, Detroit, Michigan.

The Sea-lily

John Rice Ball

Note: Those of us who have spent time out of doors among limestone exposures often have seen little disk-like fossils in the rocks. We have wondered about the nature of these remains. Are they plant or animal? If the latter, what were they like when alive? Accordingly, we have asked Dr. Ball to explain the nature of these fossils and tell us about the living animals which they represent. —*Ed.*

A LARGE and motley assemblage of marine invertebrates is known to science as the echinoderms, or Echinoderma. Present day representatives of the group are called starfishes, sea-urchins, feather-stars, brittle-stars, serpent-stars, sea-cucumbers and sea-lilies. The

sea-lilies differ from the rest of their echinoderm relatives in that they are a sedentary group, attached to the sea floor for the better part of their lives. In this respect they show a more primitive habit than their mobile associates. Two groups of echinoderms, extinct before the vertebrates fairly had a start, also were attached forms. The extinct echinoderms are sufficiently known from fossils to merit the names

Fig. 1. A modern crinoid, *Pentacrinus decorus*, showing flexible stem with its cirri, calyx not much wider than the stem, branching arms and numerous pinnules.

of sea-cysts and sea-buds, respectively. This leaves the sea-lilies the only surviving members of the phylum to retain the plant-like fixation habit of the extinct groups.

The term, Echinoderma, is a composite built in part on the word from the classical languages which gives us the scientific label for the hedgehog—*echinos*. The hedgehog likeness is well sustained by many of the sea-urchins which have remarkably long spikes. *Echinos,* or hedgehog, plus *derma*, or skin, defines then, in the broadest sense, a common trait characterizing all of the animals named above—the hedgehog skin.

Individually the sea-lily possesses a scientific name much more appropriate probably than the term for hedgehog skin. Its technical term, crinoid, is derived from the Greek and means literally, "like a lily." The sea-lily is an echinoderm which has the distinction of having become known to man largely through the collections of its fossil forms. Usually the process is reversed and we learn to identify some curious fossil "unknown" by analogies with the living organisms. But in the case of the crinoid the zeal of the hobbyist and the enthusiasm of the professional collector have contributed a major portion of the existing knowledge concerning crinoids. The modern sea-lily (Fig. 1) lives in relatively inaccessible salt waters and its study really is reserved for the specialist. But the sea-lily of the past has been so abundant that almost any salt-water limestone formation will give some evidence of these strange plant-like animals.

Unfortunately the fossil record is almost always a fragmentary one since the skeleton of the crinoid is of many parts, going practically beyond the bounds of actual count. As the animal grows, in certain sections of its structure the number of its skeletal parts increases. Its habit throughout geologic time has been much the same, probably, and so there is no numerical limit to be anticipated concerning the actual count of parts for a given crinoid.

The increase in the structural elements in the crinoid skeleton comes, however, in a general region where the practical import is relatively small. This region is in the stem at the point of attachment to the body (Fig. 2). The attached crinoid is held to the sea floor by a stem or stalk of curious composition. The entire stem, as well as some of its branches known as cirri (Fig. 3), is built of a system of disks or flattened plates (columnals) which may be circular, oval, pentagonal or pentaloid in outline for each disk. After death the stem disks may become separated and subsequently accumulate in a mass which has formed the actual major portion of some of the sediments deposited in past geologic times. Thus, geological service of the crinoid has been the building of sedimentary rocks.

The disks or columnals of the crinoid stem differ so greatly from the ossicles composing the rest of the organism that in themselves they have been regarded as of slight value in identifying genera or species of crinoids and thereby proving of value as time markers in geology. There are some curious and notable exceptions, however, as in the case of a Silurian crinoid, *Myelodactylus,* a name originally coined to indicate some resemblance to the medulla oblongata. In this ancient and extinct form the stem was so large and contorted that its segments are somewhat crescent-shaped and all but enclosed the body of the crinoid. So characteristic are the segments of this stem that it

stands as a rare case of a generic name which is applied to the stem of a crinoid. However, the body of this particular organism has been discovered and is known along with its peculiar stem.

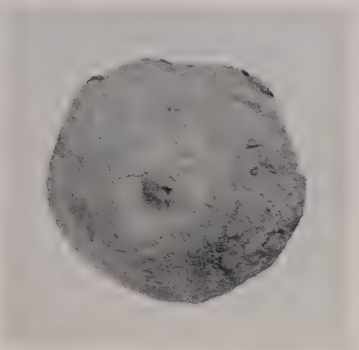


Fig. 2. Depression at the base of the calyx where stem was attached. In some crinoids several plates of the calyx are in the depression.

Fig. 3. Crinoid stem fragments, some of the specimens showing the places of attachment of the cirri. The diameters of the individual disks or columnals may range from those of a small lead pencil to those of a quarter.

There is a growing recognition in the science of paleontology that the detached stem ossicles, although incapabale of giving a clue to the genus which once possessed them, are good guide fossils in themselves to the age of the sediments in which they are found. Thus a new and added impetus has been given the collecting and study of these detached fragments. As they become familiar to paleontologists they will be used like other fossils to the commercial and scientific ends of the geological sciences. (See bibliography, Moore, R.C.)

In living forms the body of the crinoid is always surmounted by its arms, the tentacle-like appendages which mechanize the circulation system of inflowing sea water to supply the organism with food (Fig. 1). Body and arms together constitute the "crown" of the crinoid. Body alone is known as the "calyx."

To find the calyx of a crinoid, instead of a stem ossicle, is an event of moment to any collector. The arms rarely are attached because they are composed of even a greater number of ossicles than the stem, and about the only indication of their former presence is a number of paired openings about the rim of the calyx. The holes, instead of penetrating at once the wall of the calyx, sometimes are at the ends of more or less covered passages, the ambulacral tracts which may traverse the roof or tegmen of the calyx.

The calyx wall, however, is the center of interest in fossil specimens (Fig. 4). It either is composed of a variable number of calcareous, polygonal plates, or it may bear the strong imprint of plates since dissolved away by acidic waters passing through the rocks. An analysis of the wall plates shows that they are grouped in accordance with a somewhat consistent scheme of arrangement. Generally the structure shows five principal rows of plates ranging from base to top of calyx.

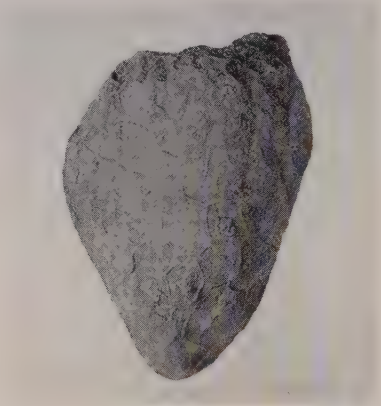


Fig. 4. Lateral view of a relatively large crinoid calyx. The outlines of polygonal plates and faint traces of the ornamentation are shown.

Starting from the basal plate in each row, or "ray," the same type of plate follows in sequence to the top of the calyx wall. A somewhat larger plate, occurring about midway in each ray, is known as the "radial" plate. The radial plate is supported in the calyx wall by one or two "basal" plates and is surmounted in the ray by one or more "brachials." Inasmuch as the same type of plate invariably follows upward in each ray, in the same order, one may, in tracing the plates from left to right around the calyx, regard the calyx as composed of circlets of plates, each circlet composed of basals, radials, or brachials, as the case may be.

The plate arrangement, as outlined above, may be regarded as the most simplified or fundamental plan of arrangement, complexities entering in as supplementary plates are introduced between the rays. The intervening plates are known as "inter-radials," "inter-brachials," and so on into further technical terms and distinctions. Some of the plates of the entire complex system are all but hidden in the depression which sometimes surrounds the point of attachment of the stem (Fig. 2.). Another interesting development is that, with the passage of geologic time, there has been a tendency in some genera to simplify

the pattern of the calyxes by a reduction in the number of basal or subbasal plates. Again, the variability in the number and arrangement of the plates gives a partial basis for identification of genera and species of the crinoids.

The arms are a part of the crinoid which strengthen greatly the resemblance of the animal to the lily or even, as some have inferred, to the palm (Fig. 1). The arms, sometimes highly branched, are composed of fractional ossicles even more numerous than in the stems. The size of the ossicle in the arms is so diminutive that probably these crinoidal fragments will remain comparatively unimportant except in most refined stratigraphic studies. The arm ossicle can readily be distinguished from the other ossicles of the crinoid in that they are more or less wedge-shaped from top to bottom and somewhat crescent-shaped in cross section.

The sediments of the Silurian seas which once swept over the site of Chicago have received their due quota of crinoid remains. Reefs built by the corals of those days in the localities now known as Thornton, Cicero, Bridgeport, and Racine, were populated by a fair proportion of crinoids also. For this reason the monograph written by the late Stuart Weller of the University of Chicago and published as Bulletin IV of the Chicago Academy of Sciences in 1900 stands as one of the important contributions to the literature on North American crinoids.

Other crinoid localities in the United States are in Burlington, Iowa; Crawfordsville, Indiana; and in the valley of the Tennessee River in the western part of the state. It might be well to add that today's value of these localities is largely an historical one. The choicest of the specimens, like the gold of '49, have been taken by the earlier collectors. Regarding fossils, however, unlike the gold of accessible regions, possibilities of a lucky "find" always exist. Quarries still are being opened and operated and these are the happy hunting grounds for the collector. And, in addition, fossil hunting carries the same unfailing reward as does a fishing trip—at least one gets a chance to go!

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Henry C. Cowles

Henry Chandler Cowles

1869-1939

DR. HENRY CHANDLER COWLES, Emeritus Professor of Botany at the University of Chicago, died September 12, 1939.

Dr. Cowles was associated with the Chicago Academy of Sciences for many years, having given lectures before its membership on many occasions beginning in 1899. Later he was elected to Life Membership and was a Vice-President from 1912 to 1914 and from 1920 to 1921. He served as President from 1922 until 1934, when he was forced to resign because of ill health. In recognition of his many valued services, he was elected a Fellow of the Academy in 1934, shortly after his retirement from active work.

He was a great teacher of botany and made important contributions to that science, and was active in many scientific organizations. For many years he was a member of the Board of Directors of the Geographic Society of Chicago and its President from 1912 to 1914.

During the years in which Dr. Cowles was President and Professor Cox Chairman of the Board of Scientific Governors, the Academy expanded its activities and added materially to its collections and increased its services to the public. In his quiet way, he accomplished a great deal, and his delightful personality and keen humor endeared him to all. We have greatly missed him since it became impossible for him to take an active part in our work and wish to express to Mrs. Cowles and her daughter our sincere sympathy.

N. S. Davis, III.

Weeds

Anna Pedersen Kummer

Note: Last spring an exhibit of common weeds from the herbarium of Anna Pedersen Kummer attracted much attention at the Academy. Mrs. Kummer has very kindly furnished another exhibit, considerably larger, comprising about fifty species which may be found in the fall. This exhibit is now in the lobby of the Museum, and will remain until sometime in November.

"A weed is a plant that is growing where it is not wanted." This definition, volunteered by a high school botany student, can scarcely be improved upon.

The study of weeds is open to every natural history enthusiast, even the city apartment dweller. Curbs, vacant lots, and roadsides furnish material that no one begrudges the taking, nor does the collector's conscience ever suffer uneasiness. Naming the most common species is the first step; few people can identify the ragweeds of the Chicago Region although almost everybody talks about them.

Weed habitats and growth habits are bound to interest one who knows a few species. The seemingly frail chickweed may germinate and come into bloom by May fifteenth, the giant ragweed reaches a height of ten feet in its growing season of a single summer. The carpet weed germinates late in sunny side-walk cracks and within a few weeks develops thousands of seeds that are fine as dust.

Weeds are the farmers' traditional enemies. The Canada thistle means discomfort to the city tramper in clearings of the Forest Preserves; to the farmer it means the fouling of the ground it infests. It is proscribed by state law as is the bindweed with its pretty morning flowers. The horse nettle has vicious spines and its roots defy extermination. Frenchweed gives dairy products an odor that butter experts say cannot be eliminated. The flower-of-an-hour attracts the passerby, to the farmer it is a serious pest.

Nevertheless, weeds are not all without beauty and many are actually cultivated in flower gardens. Wild carrot is one of our laciest plants, of all flower colors the yellow of the tall buttercup seems the most dazzling, the ephemeral flowers of chicory and moth mullein are exquisite in the early morning. And where, at least in this latitude, can one find more curious plants than among the weeds? The leaves of the common mullein are woolly to the touch like the fleece of a sheep-skin coat; the nettle's stinging hairs feel like so many Lilliputian harpoons; plump purslane refuses to die, each fragment of the uprooted plant may be the beginning of a new one. The pod of the milkweed has never failed to fascinate even the most casual observer.

The weed scene is not the same year in and year out; a species abundant one year may be nearly absent in another. The nature and drainage of the soil, the spacing of the summer rains, the date of the last spring frost are some of the factors that determine what weeds shall dominate an area in a given year. Water hemlock has been especially abundant this year (1939), perhaps because of the heavy spring rains. Late summer drouth favors the growth of Russian thistle whereas the continued dryness of an old gravel dump is ideal for the prickly buffalo bur.

Weeds are indicators of grosser environmental differences as well. The sunflower that is abundant in vacant lots and roadsides of Gary, Indiana, is not the same species as the Chicago sunflower. It is an immigrant from the more arid West that has found the sandy soil to its liking. A succession of dry years will be marked by the presence of weeds that no one remembers having seen in the region; the return of the wetter portion of the cycle causes their complete disappearance.

Man is the greatest distributor of weeds. A gum-plant in the Chicago Region, far out of its range, makes one wonder how it got here. Frenchweed may indicate a shipment of freight from the Northwest. Railroad rights-of-way are homes of a cosmopolitan population, waifs from regions far and near. But how can one account for the sudden appearance of a new weed in an area that has been observed for years? And how can a species of *Eupatorium* persist in the changed habitat of parking stations and river banks of the near north side quite as though Chicago were not there at all?

The serious student of classification of plants finds weeds a real challenge. The rare or gorgeous flowers often require for their identification only that the observer be not color-blind. Weeds are more difficult. Let the student master six of the simpler smartweeds; then, if he feels self-satisfied, let him proceed to the goosefoots and finally the delightful genus *Bidens*.

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MUSEUM ACTIVITIES

Public Lectures at the Academy

The director announces the following series of free public lectures at the Museum Sunday afternoons at 3:00 o'clock during the months of October, November and December. The doors of the Auditorium will be opened at 2:45 and closed at 3:00 or before if the hall is filled. A section reserved for members will be held until 3:00 o'clock.

Oct. 29: **Biological Explorations on Lake Michigan Islands,** Dr. Robert T. Hatt, Director, Cranbrook Institute of Science, Bloomfield Hills, Michigan. Slides and motion pictures in color.

Nov. 5: **Nature Study at Starved Rock State Park,** Dr. Donald T. Ries, Park Naturalist. Illustrated.

Nov. 12: **The Human Eye — A Living Camera,** Dr. Gordon L. Walls, Ophthalmic Research Laboratory, Wayne University College of Medicine, Detroit, Michigan. Slides and motion pictures in technicolor and sound.

Nov. 19: **The Home Life of the Song Sparrow,** Margaret Morse Nice, Chicago. Natural color slides and motion pictures.

Nov. 26: **Trees — Our Lifetime Companions,** John Yocum Beaty, author and editor, Rand McNally and Company, Chicago. Slides in natural color.

Dec. 3: **Animals without Backbones.** Dr. Ralph Buchsbaum, Department of Zoology, University of Chicago. Slides and motion pictures.

Dec. 10: **Fishing in Mexico,** Dr. C. L. Turner, Department of Zoology, Northwestern University, Evanston. Slides in natural color.

Dec. 17: **Nature's Architecture,** Dr. C. O. Schneider, Chicago. Photographs in natural color.

New Exhibits

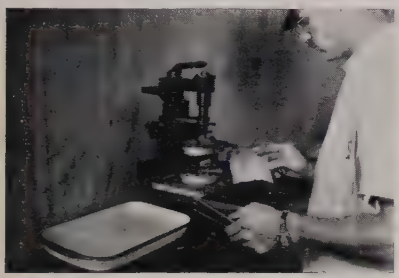
ECOLOGICAL GROUPS

Members of the laboratory staff during the past summer have been engaged in collecting materials and preparing accessories for the new series of ecological groups to be installed at the south end of the third floor of the Museum.

The first of these exhibits is to represent the forest floor of a beech-maple climax forest, the field studies for which have been made near Smith, Indiana (see photograph opposite page 67). Dr. Orlando Park of Northwestern University, who has been studying the ecology of this region for several years, is assisting as technical consultant in the preparation of this group. The life which centers about a decaying log will receive special emphasis.

Photographs from which the backgrounds will be enlarged, and specimens

of plants and other accessories from which reproductions are made in celluloid and wax have been collected. Between twenty and thirty species of plants—fungi, lichens and mosses, as well as flowering plants—will be included. The leaves of higher plants are reproduced in fire-proof celluloid by a process developed some years ago in the laboratory of the Academy by Earl G. Wright. Each leaf is first moulded in plaster and from this mould a lead die is cast. The lead die, in a heated press,



is then used to stamp out impressions of the leaves in sheets of celluloid. Between eight hundred and a thousand unit parts of this nature will enter into this exhibit, the production of these accessories involving more than 15,000 manual operations. The natural bodies of certain insects, myriapods and arachnids will be used, but soft-bodied animals such as frogs, salamanders, slugs, and insect larvae, as well as fungous growths, are reproduced in celluloid or wax.

NESTS AND EGGS OF LOCAL BIRDS

An exhibit of the nests and eggs of birds of the Chicago Region has recently been completed. It is located in the northeast corner of the third floor, adjacent to the systematic collection of birds of the Chicago Area. In the preparation of the new exhibit the museum staff was assisted by Edward R. Ford, honorary curator of oölogy. The eggs of more than fifty species and many typical nests are exhibited. The collection is far from complete, of course, but includes representatives of fifteen orders and thirty-one families. Several species of flycatchers, warblers, blackbirds, and swallows are shown as examples of different types of variation. Sets of eggs were selected to show the normal condition as accurately as possible, although the number of eggs often varies somewhat. Labels give common names of the species and brief information about the composition of the nests and the habitat in which it is usually placed.

The Academy's collection of birds' eggs for scientific study includes representatives of nearly all species known to nest in the Chicago Area. Through the efforts of Mr. Ford it has recently been put in excellent condition. It is available for the use of any qualified student.

A SURVEY OF THE MAJOR GROUPS OF ANIMALS

A rearrangement of the series of exhibits giving a synopsis of the major groups of animals, both recent and fossil, was undertaken some months ago by Mr. Lowrie and is now nearing completion. Much new material in the form of specimens, models, diagrams, and labels has been added. When finished the exhibit will comprise a short and, it is hoped, interesting résumé of the animal kingdom from the lowly microscopic amoeba, illustrated by enlarged models, to the varied insects, crustaceans, and vertebrates. Various zoological principles will be illustrated and, whenever possible, fossil forms will be shown along with their more recent relatives. This exhibit is planned with the needs of biology classes in mind, but the casual visitor who wishes to know something of the diversity of form and function in the animal world will also find it interesting and valuable.

New Books for Reading Room

A collection of two hundred books on natural history and popular science has been received from the Chicago Public Library as a special deposit for the public Reading Room of the Academy. Loaned for an indefinite time, these books do not circulate but are available

to visitors during Museum hours, except Sundays. The interest shown by the Librarian and staff of the Chicago Public Library in rendering this assistance is greatly appreciated by the officers of the Academy and members of the Museum staff.

A wide range of subjects is covered by the new acquisitions: mechanics, electricity, astronomy, pets, aquaria, biographies of naturalists, household physics and chemistry, climates, aeronautics, Indian crafts, travel, animal stories, wild flowers, birds, insects, mushrooms, trees, minerals, general science, and numerous others. Many of these books are suitable for children but a large proportion of them are reference books which will be of interest to adults. Teachers will find among them many that will be useful to them and to which they can refer their students.

With this really fine start in augmenting the resources of the Academy library, it is hoped that members and friends of the institution will wish to aid in making the Reading Room more attractive and still more useful. There are many needs here for which the Academy's present income cannot provide. One of the most urgent of these is an additional table with chairs. Some bright colored maps and pictures for the walls and a large geographer's globe would increase the attractiveness of the room. Many standard reference books which have been on the shelves for several years and are still valuable are in need of rebinding, and several complete or nearly complete runs of periodicals, such as *Nature Magazine, Scientific Monthly,* and *Natural History*, would be much used if bound. A cabinet and display rack for museum leaflets and other publications of the Academy are also needed. The Director will be glad to confer with anyone who may wish to help bring these plans to completion.

Technical scientific material has also been added to the library in the past few months, that received from the estates of the late William I. Lyon and Celia Berlizheimer being especially appreciated.

Field Work

GREAT SMOKY MOUNTAINS

Plans conceived about two years ago by Dr. Orlando Park of Northwestern University and Walter L. Necker of the Academy staff to take a class in zoology to the Smoky Mountains of North Carolina and Tennessee were realized this June. The Smokies have long been of special interest to the Academy, seven past and present members of the staff having spent an aggregate of about three years in this beautiful section of the southern Appalachians. The first papers on the reptiles and mammals of this region were published by the Academy. The vertical distribution of the flora and fauna in this region is of special interest, and particularly easily noticeable, in part because of the exceedingly rich fauna and abundance of animals. To Dr. Park's class in zoogeography the trip, from the eleventh to the nineteenth of June, gave a better understanding of the factors affecting animal distribution and a brief, firsthand contact with one of the centers of dispersal of our eastern bios—remarkable alike both for the grandeur of its scenery and for the biological significance of its denizens. To the museums of the Academy and Northwestern University it added many valuable specimens for teaching and research—a particularly large collection because of the enthusiasm of Dr. Park's sixteen students.

The cabin of the Smoky Mountains Hiking Club, near the first Academy camp of 1931, was graciously placed at the disposal of the group. During part of their stay the members of the party had the pleasure of the company of Dr. Stanley Cain, of the University of Knoxville, and Dr. Willis King, of the National Park Service. Mr. Necker has prepared a list of the more important literature about the Smokies, as well as a list of the reptiles and amphibians, a few mimeographed copies of which are available to members of the Academy.

SOUTHERN TEXAS

Dr. and Mrs. Gloyd spent four weeks in May and June traveling and collecting in the South. Field work in extreme southern Texas for the purpose of obtaining specimens of reptiles and insects, which occur in the United States only in that region, was a special objective of this trip. En route through Mississippi, Arkansas, Alabama, and Louisiana they called upon various naturalists, making brief field trips with them on several occasions.

In Texas they visited the old townsite of Indianola on the south shore of Matagorda Bay. An important seaport in the fifties, it was completely destroyed by a hurricane in 1886. Since many of the government expeditions for exploring the West used this town as a shipping point and outfitted there, Indianola appears in early scientific literature as the type locality of many species of animals. From an historical point of view the townsite is of great interest to naturalists.

While engaged in field work in the Lower Valley of the Rio Grande, between Rio Grande City and Brownsville, the Gloyds enjoyed the companionship and assistance of Mr. and Mrs. Stanley Mulaik of Edinburg. A teacher of biology in the junior college at Edinburg during the past several years, Mr. Mulaik has made numerous contributions to the natural history of southern Texas, especially through his studies of spiders and of amphibians and reptiles. He has presented to the Academy approximately one hundred herpetological specimens.

Of the four kinds of snakes known to occur in the United States only in southern Texas, only one species was collected. Several specimens were secured, however, and another of the four restricted species was obtained from Bryce C. Brown of Harlingen. Representatives of these snakes are especially needed for photographing and study in the preparation of the handbook of the snakes of the United States initiated by the late Dr. Frank N. Blanchard and continued by Dr. Gloyd.

A dry period, unusually prolonged even for the Southwest, had made conditions unfavorable for collecting insects and reptiles. Mrs. Gloyd, however, obtained five species of dragonflies new to the known fauna of the United States and several not recorded for the state of Texas. As one of the tangible results of this trip, over three hundred and fifty specimens of amphibians and reptiles have been added to the study collection of the Academy.

Dr. Ball Studies Geology of Tennessee Valley

Dr. John R. Ball, honorary curator of geology and paleontology and one of the scientific governors of the Academy, is on leave of absence from Northwestern University this fall and is engaged in field studies on the geology and paleontology of the Tennessee Valley. Since certain areas in this region will be permanently inundated when the Gilbertsville Dam of the TVA project is completed, this research is somewhat unique. Dr. Ball will not only collect fossils but also will make detailed observations and measurements of the strata before the dam goes in and some of the rocks disappear under water. The purpose of these studies is to ascertain, if possible, how closely the rocks of this region may be correlated with those of other regions of the same geological age with respect to time of deposition and the distribution of life forms.

The valley of the Tennessee River in the western part of that state is a world-famous locality for fossiliferous rocks of the Silurian and Devonian systems. The rocks are limestone and calcareous shales and the sediments composing them were once deposited in an aggregate thickness of over 1000 feet. Great masses of these stratified rocks have been completely weathered away, but their former presence is indicated by the scattered fossils now left through the areas once filled by the rocks. The fossils are slightly more resistant to weathering than the rocks which con-

tained them and are thickly clustered in the "glades" of western Tennessee, literally carpeting the soil in places.

For more than 100 years these collecting grounds have been a Mecca for European and American geologists and palentologists. The fossils include beautiful and rare species of crinoids, the "sea-lilies" described by Dr. Ball in this issue of the NATURALIST. Although the fossils of the region have been described and illustrated, as well as the rocks containing them, yet the areal extent and structural relations of the rocks have not been mapped in detail.

The Silurian rocks of western Tennessee are a part of the same series once deposited extensively in parts of Missouri, Arkansas, and Oklahoma as well as elsewhere in the Mississippi Valley. Since some of Dr. Ball's earlier research has dealt with the paleontology and stratigraphy of other Silurian formations, he has a special interest in the Tennessee Valley deposits.

In a sense the Chicago Academy of Sciences regards the present study as an Academy project. Inasmuch as the paleontological collections of the Academy do not contain a full representation of fossils from this region, it is Dr. Ball's plan that a portion of the material collected be given to the Academy for study and exhibition.

Scientific Meetings

The American Society of Ichthyologists and Herpetologists held its twenty-second annual meeting in Chicago, September 13-16, with scientific sessions at the Field Museum, the Chicago Academy of Sciences, and the Shedd Aquarium, and convention headquarters at the Medinah Club. A registered attendance of one hundred and eleven represented many parts of the United States and Canada, from New York to California.

The Society met at the Academy on the second day of the convention, the formal program consisting of the reading of fourteen technical papers, chiefly herpetological. Members and visitors had opportunity for examining the Academy's study collections as well as the public exhibits. The Zoology Department of Northwestern University held open house for those in attendance on the first evening, a smoker was held at the Shedd Aquarium, and the meeting closed with a dinner at the Medinah Club.

Special exhibits arranged by the Academy for this occasion were one hundred salon photographs of fishes and reptiles, including six photographs of fishes in natural color by Walter H. Chute of the Shedd Aquarium; a collection of naturalists' bookplates; paintings of fishes and reptiles in oils and water colors by artists connected with the Milwaukee Public Museum; a series of technical illustrations by leading scientific artists, showing various techniques in current use; and a collection of living snakes of the Chicago Region by the Amateur Herpetologists group of the Academy.

Walter L. Necker was elected official historian of the Society and Dr. Gloyd was reëlected vice-president; both were made members of the Board of Governors.

Visiting Scientists

Dr. and Mrs. J. R. Collins of the Royal Astronomical Society, Toronto, Ontario, called at the Academy last May while on a tour of observatories and astronomical museums of the United States. Dr. Collins, Secretary of the Society, was especially interested in the Atwood Celestial Sphere and favorably impressed with its possibilities in teaching elementary students.

Among other distinguished visitors were Dr. Robert Cunningham Miller, Director of the California Academy of Sciences, San Francisco; Dr. Ruth Patrick, associate curator of the Philadelphia Academy of Sciences; the Reverend Felix Nolte, O.S.B., curator of the museum, St. Benedict's College, Atchison, Kansas; and Dr. Wesley Clanton, zoologist of the Kentucky Woodland Wildlife Refuge, Hopkinsville, Kentucky.

New Members

The following were recently elected to membership in the Academy:

Life

Mrs. Hubbard Carpenter

Sustaining

Frank A. Banks
Mrs. Robert B. Gregory
Paul J. Kahn

Associate

John Y. Beaty
Lyman Carpenter
Edgar B. Carter
Joel Conway
Hugo Dalmar, Jr.
Richard A. Edgren
Samuel A. Harper
L. Allen Higley
Ernest Charles Hirsch
Dr. Herman Humphrey
Duval B. Jaros
John F. Kurfess
John R. Millar
Dr. Tell Nelson
Stanley M. Pawelzyk
Karl Plath
Hugh A. Rice
Paul C. Shelley
Sister Mary Adrian, R. S. M.
Sister Mary St. Rose
Robert S. Sturgis, Jr.
Elsie Wieczorowski

(Continued from page 72)

For the *ulkei* the summer months are characterized by great activity, only a part of which is food-getting. The galleries have to be repaired and extended; the cap may need reinforcement where it may have been damaged by rains or animals; young have to be reared; and every individual must work toward the grand climax, the wedding day, when the young queens seek to establish new colonies. There are endless duties, in short, and no ant shirks that which is her responsibility by virtue of having been born into such a complex social system. But there is a time when all workers can rest:—winter! The first cool days of fall keep all but the most ambitious inside their sheltering mounds. Later the penetrating cold drives them deeper and immobilizes them for their long, practically motionless, rest. They cluster together in their burrows, from frost line down two feet or more below. This hibernation can be interrupted momentarily, for blowing warm breath over a few workers held in the hand causes them to become as active as they would normally be in summer when such temperatures prevail.

More than eight years have passed since I first looked upon the *ulkei* mounds of Palos and their sanctuaries are in as efficient a state now as when I first saw them. As long as man does not interfere, all will probably remain well along the *ulkei* sector. Because of their superior ability to cope with their environment, these ant communities have doubtless witnessed the development of other societies in the same region, the human members of which could have consulted them with profit for a better understanding of how to live together peaceably. May the *ulkei* long continue to dominate the area encircled by the "Pyramids of Palos"!

—General Biological Supply House, Inc., Chicago.

A Laboratory Introduction to Animal Ecology and Taxonomy

By Orlando Park with a foreword by W. C. Allee

University of Chicago Press, 1939, x, 272 pages, 16 plates, spiral binding. $2.00.

It is seldom that notice of a laboratory manual would find its way into the review section of The Chicago Naturalist, but this one is far more than a "laboratory manual." The first twenty pages of the book, bearing the cumbrous title "Introductory discussion concerning the interrelationships of animals with their environment" is unquestionably the nicest exposé of ecology (the modern version of what was once known as Natural History) yet written. Dr. Park is to be congratulated on boiling down the subject matter and yet retaining a full picture in thirty minutes reading time—thirty minutes which will be spent again and again by anyone professing an interest in natural history. Ecology is still a new science and has been encumbered with endless new terminology by some of its devotees; this terminology is here kept to a rational minimum, and that with concise definitions which will clarify the picture for both layman and student.

The next hundred pages are the "laboratory exercises"—but don't be frightened off for, as Dr. Allee states in the foreword, "They are adapted not only for the introductory college courses for which they were prepared, but also for interested amateurs who are being self-educated—fortunately there are such—and for the advanced high school students." Many of the exercises have undergone revision through "three generations," first having been written by Dr. V. E. Shelford, then revised by Dr. W. C. Allee, and now again revised and for the first time brought to light in printers' ink by Dr. Park. The exercises require no expensive equipment or animals. Almost all the material can be collected near the city by anyone interested. The variety of animals and subjects is sufficient for any amateur to find fascinating study for many Sundays.

No layman should have any difficulty classifying animals to orders with the key, which is enhanced by an excellent glossary and admirably executed plates by T. J. Daggy. A bibliography of over eight hundred titles enables the interested to pursue further whatever their fancy leads them to—and we trust that will be far with Dr. Park's "introduction."

—W. L. Necker.

Edible Wild Plants

By Oliver Perry Medsger

The Macmillan Co., 1939, 323 pages, illustrated with 80 pen and ink drawings and 19 photographs. $3.50.

Every outdoorsman is aware of many edible wild plants, but few have taken time to list and classify them. Even an experienced field man will discover many surprises as he scans the pages of this book and notes the plants included, plants he may have walked among and examined without suspecting their utility.

The skunk cabbage may be added to our list of foods; the peculiar gall-like enlargements of azalea buds have an appetizing flavor; milkweed, arrow-

head, Indian cucumber root, pepperwort and valerian are a few of the many common plants not generally known for their food value. These are but examples of the great number of plants described with paragraphs included explaining how to prepare them and what to expect of them as food.

The student who wishes to extend his experiences with edible plants will find this book of great value.

—V. O. Graham.

The Migration of American Birds

By Frederick C. Lincoln

Doubleday, Doran & Co., 1939, xii, 189 pages, 12 plates, 22 maps. $4.00.

The general reader and the ornithological tyro will find much interesting information in the twelve chapters of this book. Various aspects of the problem of bird migration are treated in an easy, concise style. A series of twenty-two maps attractively illustrate the principal North American flyways and the migration routes of several outstanding species. The twelve colored plates are from paintings made many years ago by Louis Agassiz Fuertes for Eaton's *Birds of New York*. These plates have been familiar to the majority of bird students for nearly three decades and it is extremely distressing to find them reproduced here so poorly. The typography and format of the book are pleasing and an index expedites the finding of specific information.

The advanced amateur and professional ornithologist will find this book disappointing. It apparently adds litle to the fund of information already easily accessible. In the historical chapter the author has relatively much to say about the migration lore of the ancients but passes completely over that period of American ornithology when really outstanding contributions to the study of bird migration were made by such diligent and competent workers as the late Wells W. Cooke and the late S. Prentiss Baldwin. There is no bibliography and the serious student will find little in Mr. Lincoln's book to help him pursue the subject of avian migration.

—H. K. Gloyd.

Turtles of the United States and Canada

By Clifford H. Pope

Knopf, New York, 1939, 360 pages, illustrated. $3.75.

This is the first complete account of American turtles. Turtles, because of their long history, strange anatomy, and relative abundance, are some of our most fascinating animals but—strangely enough—there are many gaps in our knowledge of them. Mr. Pope effectively coordinates what we do know about these animals, tells how to care for pet turtles, and gives a key for the identification of American species.

Unfortunately Mr. Pope presents his own novel ideas of taxonomy, not previously published with substantiating proof, in this popular book—a regrettable action in that it will undoubtedly cause confusion for the layman attempting to compare turtles discussed in this book with those described by other authors. The book, however, serves a long-felt need, and is written in the same pleasing style as Mr. Pope's other popular book, *Snakes Alive*, reviewed two years ago.

—W. L. Necker.

Ancient Man in North America

By H. M. Wormington

Colorado Museum of Natural History, Denver, Colorado, 1939, 80 pages, illustrated. 30 cents.

An attractive booklet, with glossary and bibliography, of a subject of great interest to many people. The author not only treats the artifacts and various peoples individually, but also has presented an interesting discussion of routes of migration.

—W. L. Necker.

A Second Book of Plant Names

By Willard N. Clute

Willard N. Clute & Co., 1939, xi, 164 pages, $3.00.

The season is at hand to gather gnome's gold for our winter bouquets. And, you may ask, "What is that?"

Mr. Clute, author-publisher, experienced and well-known in his field, tells us in this book that our popular and beautiful bitter-sweet *(Celastrus scandens)* is known as gnome's gold in many localities. In seventeen chapters, of interest to the casual as well as to the serious student of plant life, he acquaints the reader with the many sources from which plants have received their names. Changes in both the scientific and the vernacular names are indicated. Belief in fairies, goblins, and witches with power for good or evil over man, influenced the naming of plants. Errors of the printer and the phonetic sound of mispronounced words were responsible for the curious and unusual names attached to certain plants. The "ancient doctrine of signatures" resulted in such names as liver-wort and lung-wort. Neck-weed, gallous-grass, and loco-weed all designate our common bird-seed hemp *(Cannabis sativa)* in the western states. During frontier days the long, strong fibers of this plant were made into hemp rope with which to hang criminals, hence the names neck-weed and gallous-grass. Today the same plant is the much publicized Marijuana or "Mary Jane."

Latin names have become the vernacular—rudbeckia, gaillardia, dahlia—and vernacular names have become the scientific—aster, oxalis, geranium, petunia. Other names, for example, violas, liliums, lupinus, and rosa, have changed but slightly. Puzzling technical names are discussed in an enlightening manner; a pig-weed has become fleur-d'amour and floramor because *Amaranthus*, the generic name, was mistaken for "amour-anthus" or flower of love. There are wart-worts, mad-worts, rattleweeds, and milkweeds; bug-banes and dog-banes, and an endless list for which the pros and cons of popular usage are given.

The book is so written that one may enjoy its perusal in a casual manner or systematically from cover to cover, but from either angle the reader will be convinced of the need for botanists, florists, and gardeners to agree upon a standardized classification of names and to educate the general public in the use of the correct technical name in all cases.

—Grace Z. Harsch.

Plant Growth Substances

By Hugh Nicol

Chemical Publishing Co., New York, 1938. xii, 108 pages, 6 figures, $2.00.

The first two chapters explain the history and theory of chemical aids to plant growth for the layman while the rest of the book deals with the technical and practical aspects of this new and important phase of horticulture.

Wild Flowers of Ohio

By Harold L. Madison

Cleveland Museum of Natural History, 1938, 190 pages, $1.50.

This small pocket guide, attractively bound in leatherette, describes and figures eight hundred and twenty-five species of wild flowers. A simple "key" and an illustrated glossary of all terms are also included. The book should prove of definite value, even in the Chicago Region, since the flora here is quite similar to that of Ohio.

Book of Trees

By Lewis H. Mills and Gertrude C. Hawkins; illustrations by Earl G. Wright

Rand McNally & Co., 1939, 64 pages. 10 cents.

The second of a series of inexpensive nature books, illustrated by Mr. Wright, Curator of Exhibits at the Academy.

THE NATURALISTS CALENDAR OF EVENTS

CHICAGO ACADEMY OF SCIENCES, Lincoln Park at Clark and Ogden Ave., Diversey 5871.

CHICAGO AQUARIUM SOCIETY, Mr. Harmon K. Greene, Secretary, Plaza 2088. Meetings at Academy third Wednesday of each month, 8:00 P. M.

CHICAGO CACTUS SOCIETY, Mr. Frank K. Balthis, President, Garfield Park Conservatory, Van Buren 8100. Meetings last Sunday each month, Garfield Park Conservatory, 3:00 P. M.

CHICAGO ENTOMOLOGICAL SOCIETY, Mr. Alex K. Wyatt, Secretary, 5909 N. Virginia Avenue, Ravenswood 3115.

CHICAGO ORNITHOLOGICAL SOCIETY, Mr. Rudyerd Boulton, President, Field Museum, Wabash 9410. Meetings third Tuesday each month, Crerar Library, 8:00 P. M.

FRIENDS OF OUR NATIVE LANDSCAPE, Miss R. B. Eskil, 6016 Ingleside Avenue. Hyde Park 8313.

GEOGRAPHIC SOCIETY OF CHICAGO, 7 S. Dearborn, Randolph 5293. Resumes meetings in October.

ILLINOIS AUDUBON SOCIETY, Chicago Academy of Sciences, Diversey 5871.

MARQUETTE GEOLOGISTS ASSOCIATION, Mr. George J. Huss, Secretary, Canal 1828. Meetings at Academy first Saturday of each month, 8:00 P. M.

MID-WEST HORTICULTURAL SOCIETY, Administration Building, Garfield Park, Van Buren 8100. Meetings last Friday each month.

PRAIRIE CLUB, 38 S. Dearborn Street, Dearborn 3737.

STATE MICROSCOPICAL SOCIETY OF ILLINOIS, W. L. Necker, Chicago Academy of Sciences, Diversey 5871.

Oct. 17 Chicago Ornithological Society, *History of Banding Great Blue Herons,* Karl Bartel, Auditorium Building, 431 South Wabash Avenue, 8:00 P. M.

Oct. 17 Prairie Club open meeting, the African film *Dark Rapture* will be shown at the Chicago Woman's Club Theatre, 8:00 P. M.

Oct. 19 Amateur Herpetologists, *Trailing Texas Reptiles,* Dr. Howard K. Gloyd, Auditorium, Chicago Academy of Sciences, 7:30 P. M.

Oct. 20 State Microscopical Society of Illinois, Auditorium, Chicago Academy of Sciences, 8:00 P. M.

Oct. 21 Prairie Club walk, Hollywood to Brookfield, 4-5 miles.

Oct. 22 Friends of Our Native Landscape, meeting in the shelter at the Dunes.

Oct. 22 Prairie Club walk, West Lake Forest and Lake Forest, 10 miles.

Oct. 24 Geographic Society of Chicago, *Pioneering for Pandas,* Ruth Harkness, Orchestra Hall, 8:00 P. M. (Members).

Oct. 27 Prairie Club, colored photographs, Club office, 7:00 P. M.

Oct. 28 Prairie Club walk and Hallowe'en steak fry, Park Ridge to Des Plaines, about 5 miles.

Oct. 28-29 Prairie Club Hallowe'en circus, Tremont Beach House.

Oct. 29 Chicago Academy of Sciences public lecture, *Biological Explorations on Lake Michigan*

Islands, Dr. Robert T. Hatt, Academy Auditorium, 3:00 P. M.

Oct. 29 Chicago Cactus Society, Garfield Park Conservatory, 3:00 P. M.

Nov. 4 Marquette Geologists' Association, Auditorium, Chicago Academy of Sciences, 8:00 P. M.

Nov. 4 Prairie Club walk, Glenwood.

Nov. 5 Chicago Academy of Sciences, *Nature Study at Starved Rock State Park,* Dr. Donald T. Ries, Academy Auditorium, 3:00 P. M.

Nov. 5 Prairie Club scouting hike.

Nov. 8 Midwest Horticultural Society, Administration Building, Garfield Park, 8:00 P. M.

Nov. 8 to Dec. 3 Chrysanthemum Shows, Garfield Park and Lincoln Park Conservatories, 8:00 A. M. to 10:00 P. M.

Nov. 11 Prairie Club walk. Des Plaines to Park Ridge.

Nov. 11-12 Prairie Club week-end trip to Wedron.

Nov. 12 Chicago Academy of Sciences public lecture, *The Human Eye—A Living Camera,* Dr. Gordon L. Walls, Academy Auditorium, 3:00 P. M.

Nov. 14 Geographic Society of Chicago, *Cliff Dwellers of the Far North,* Rev. Bernard J. Hubbard, Orchestra Hall, 8:00 P. M. (Members).

Nov. 15 Chicago Aquarium Society, *How Fishes See Their World,* Dr. Gordon L. Walls, Auditorium, Chicago Academy of Sciences, 8:00 P. M.

Nov. 16 Amateur Herpetologists, Auditorium, Chicago Academy of Sciences, 7:30 P. M.

Nov. 17 State Microscopical Society of Illinois, Auditorium, Chicago Academy of Sciences, 8:00 P. M.

Nov. 18 Prairie Club, J. R. Bray special walk.

Nov. 19 Chicago Academy of Sciences, public lecture, *The Home Life of the Song Sparrow,* Margaret Morse Nice, Academy Auditorium, 3:00 P. M.

Nov. 19 Chicago Entomological Society, Reading Room, Chicago Academy of Sciences, 2:00 P. M.

Nov. 21 Chicago Ornithological Society, *Observations in Western National Parks,* Dr. R. M. Strong, Auditorium Building, 431 South Wabash Avenue, 8:00 P. M.

Nov. 23 Prairie Club Thanksgiving walk, Barrington.

Nov. 25 Prairie Club walk, Morton Grove.

Nov. 26 Chicago Academy of Sciences, public lecture, *Trees—Our Lifetime Companions,* John Yocum Beaty, Academy Auditorium, 3:00 P. M.

Nov. 26 Prairie Club walk, West Chicago and Winfield.

Nov. 26 Chicago Cactus Society, Garfield Park Conservatory, 3:00 P. M.

Nov. 28 Geographic Society of Chicago, *From Capetown to Nairobi,* Professor Wallace W. Atwood, Orchestra Hall, 8:00 P. M. (Members.)

Dec. 3 Chicago Academy of Sciences public lecture, *Animals without Backbones,* Dr. Ralph Buchsbaum, Academy Auditorium, 3:00 P. M.

Dec. 10 Chicago Academy of Sciences public lecture, *Fishing in Mexico,* Dr. C. L. Turner, Academy Auditorium, 3:00 P. M.

Dec. 17 Chicago Academy of Sciences public lecture, *Nature's Architecture,* Dr. C. O. Schneider, Academy Auditorium, 3:00 P. M.

Nine More Weeks to Christmas

and

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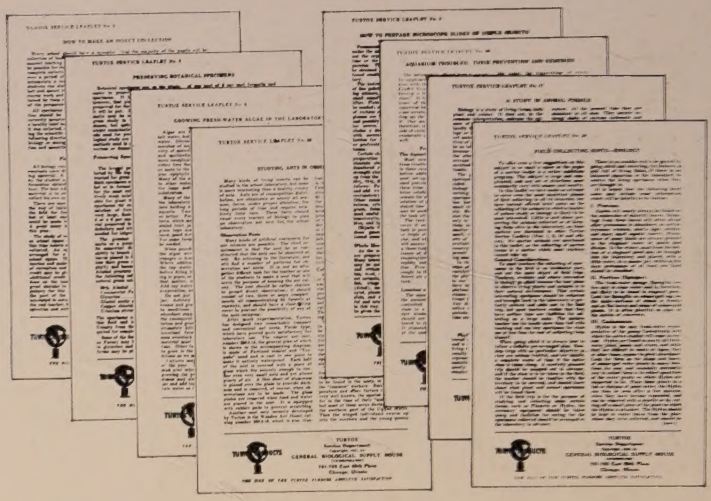

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